Shell Development (Australia) Pty Ltd
(ACN 14 009 663 576)

Environment Plan
WA-489-P Metocean Buoy

Summary

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1. Shell as Operator

Shell's Australian exploration and production business has been operating for more than 75 years and holds an interest in about 20% of the gas resources in Australian waters. Shell is involved in a number of major Australian gas projects including the Shell operated Prelude project which will be the first deployment of Shell's Floating Liquefied Natural Gas (FLNG) technology. Shell is also a non-operating partner in the North West Shelf joint venture, the Gorgon joint venture and the Wheatstone joint venture. Shell maintains an extensive exploration portfolio and has safely drilled 17 exploration wells in the Browse Basin since 2006. Shell's exploration and production business is based in Perth and employs more than 500 people.

2. Activity Description and Location

An array of metocean instrumentation will be deployed at 19.835096°S, 112.644208°E in WA-489-P over a 12 month period, in a water depth of approximately 1,250 m (see Figure 1). The purpose of the measurement program is to characterize the behaviour and variability of the currents and underlying water masses (including baroclinic tides and potentially nonlinear internal waves), and the concurrent surface processes of wind and wave. Three separate moorings to measure winds, waves and currents/seawater properties will be deployed. The moorings will comprise a combination of instrumentation and subsea buoyancy bound with wire and chain. The wind and wave moorings will require a surface buoy, while it is unlikely that the current meter mooring will require any surface buoy.

Each of the three moorings will be anchored with an approximately 1 T clump weight anchor of approximately 1 m diameter, with acoustic releases above each anchor. The subsea moorings will carry satellite beacons which will activate if the moorings surface prematurely, allowing for increased chances of recovery. The moorings shall be initially deployed around April 2014, serviced 6 months later around October 2014, and retrieved around April 2015. The vessel used for deployment, service and recovery will be approximately 25 m in length and will depart from and return to Exmouth. No at sea refuelling activities will be required.

The current and wave moorings will require service visits, however it is unlikely that the met buoy will need to be serviced. Therefore, A maximum of six anchor weights will be left on the seabed as a result of this activity, allowing for service visits where the moorings are recovered.

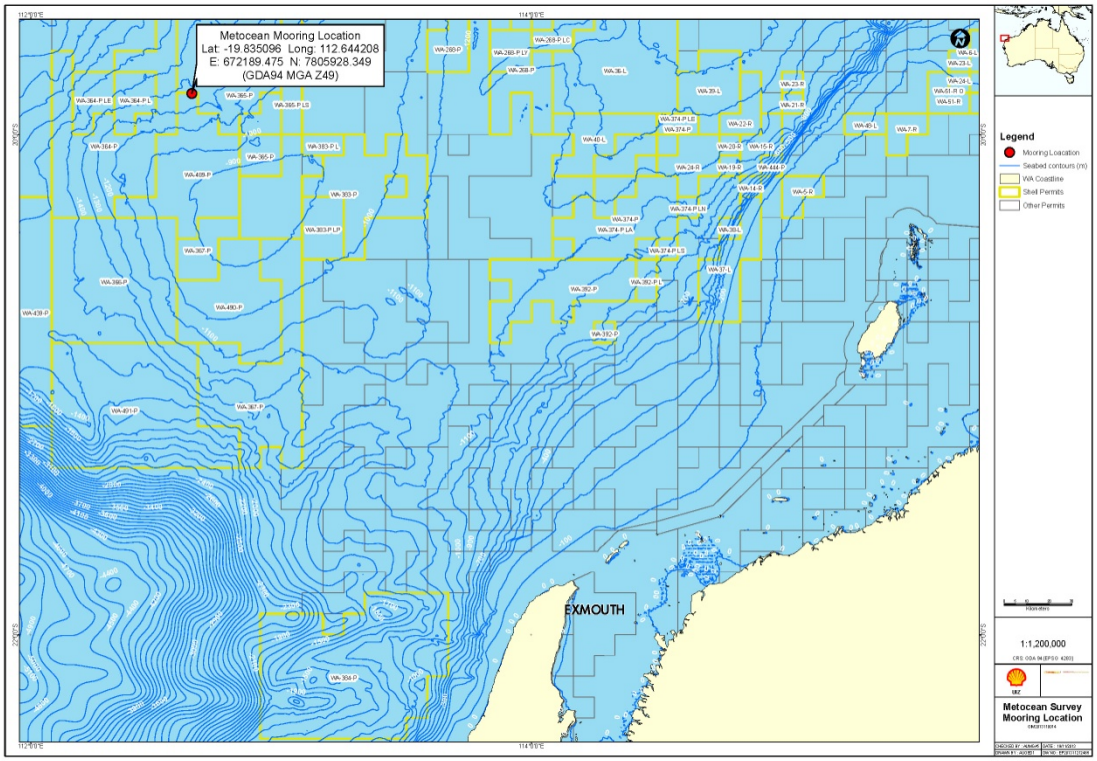

Figure 1: Location of the Metocean Buoy deployment in WA-489-P

3. Description of the Environment

3.1. Physical

WA-489-P is located on the continental slope in water depths ranging from 800-1250 m. There are no significant or shallow seabed features known to occur in the area. The seabed of the permit area is gently sloping to the south with strong gradients to the north, with some deepwater canyon systems occur in the surrounding permits. The nearest emergent land mass is North West Cape and near-by islands, some 250 km from the metocean buoy location.

The most prominent environmental feature of the broader region is the Ningaloo Reef, which is protected by the Ningaloo Marine Park, under joint State and Commonwealth jurisdiction and forms part of the Ningaloo Coast World Heritage Area, and islands of the North West Shelf. The Ningaloo Marine Park boundary is located approximately 250 km south of the permit area. Ningaloo reef is a diverse fringing reef located within several kilometres of the Western Australian coastline that extends approximately 260 km southward of North West Cape.

The permit is located on the Exmouth Plateau, the largest topographic feature in the Northwest Marine Region covering an area of approximately 51,000 km^2 in water depths of approximately 500 to 5,000 m. The oceanic habitat of the region is characterised by relatively warm, low nutrient waters. The surface of the plateau is generally rough and undulating with the seabed

typically consists of fine, muddy or silty sediments. It has been suggested that the Plateau supports a significant number of species adapted to depths of 1,000 m. Due to the depths encountered in the permit areas, the seabed cannot support any light dependent coral or seagrass habitats that may inhabit shallower waters.

The climate of the North West Shelf region is arid sub-tropical with two main seasons, summer and winter. Transitional conditions, with variable and/or reduced winds, may occur over short periods between seasons, generally in September and April to May. Tropical cyclones typically occur in the region three to four times per year, bringing strong winds, heavy rain and high seas. These cyclones are unpredictable in occurrence, intensity and behaviour but can occur between November and April.

The oceanic circulation of the offshore regions is influenced by the Indonesian Throughflow, while the Leeuwin Current is dominant further south. The Indonesian Throughflow feeds warm, lower salinity water from the western equatorial Pacific, through Indonesia and into the Indian Ocean off Northern Australia. Evidence indicates that the main flow of the Leeuwin Current follow the 200 m depth contour; though side jets and eddies from this main flow may extend for tens of kilometres out to sea or towards the shore. The warm water carried south into temperate areas of Western Australia is regionally very significant. It enables tropical and sub-tropical marine species to occur much further south than they otherwise could by providing them with more suitable water temperatures and a means of transport.

3.2. Biological

There is limited information concerning the benthic communities of the permit area, due primarily to the remoteness and water depths of the area. Much of the outer mid-shelf and upper slope is covered by a relatively featureless, sandy-mud seabed with a sparse covering of sessile organisms dominated by filter-feeding heterotrophs such as gorgonians, sponges, soft corals, echinoderms and detritus-feeding crabs and echinoderms. The biological productivity of the benthic environment is expected to be limited due to low light availability at depth, low nutrient availability and limited extent of exposed hard substrates.

The benthos of the deep ocean areas is likely to support meiofauna (minute animals living between grains of sediment on the seabed such as nematodes), larger infauna (that burrow into sediments such as polychaete worms and isopods) and sparsely distributed epibenthic communities (that live on the surface of the seabed such as seapens). Mobile benthic species, such as deepwater sea cucumbers, crabs and polychaetes are likely to be associated with the seafloor, and the bioregion may support sparse populations of bentho-pelagic fish and cephalopods. Any areas of exposed hard substrate that occur may support more diverse assemblages, including deep water filter feeding organisms, such as hydroids and sponges.

Pelagic fish species likely to be present include grenadiers and hatchetfish (Argyropelecus spp.) as well as transient populations of highly mobile pelagic species, such as sharks and schools of small pelagic fish. Adult and juvenile southern bluefin tuna are thought to migrate through this bioregion on their way to and from spawning grounds in the north-eastern Indian Ocean. However, the timing of these migrations and the use of regional currents to assist their migration is still unclear. Seabirds are likely to feed on small pelagic fish in this bioregion.

The Exmouth Plateau is considered an important area for communities adapted to depths of 1,000 m. A national bioregionalisation of slope fish communities identified the North West Slope (which occurs in this bioregion as well as the adjacent Timor Province) as supporting the second richest demersal fish assemblage nationally. Over 508 fish species have been identified on the slope in this area, and 64 of these species are endemic. Demersal slope fish species in this bioregion are distributed across a number of distinct depth ranges on the slope, specifically areas of the upper slope (225–500 m) and mid slope (750–1,000 m). The high diversity and endemism of the demersal fish fauna indicates important interactions between physical processes and trophic structures in this bioregion.

The Department of the Environment Protected Matters Database does not list any Threatened Ecological Communities occurring in the marine environment. The Protected Matters Database lists 11 Threatened Species that potentially traverse the permit area, and ten of which are migratory species. Migratory species that may occur within the metocean buoy area include seven cetacean species, two bird species, five reptile species and three shark species. The permit area does not contain any recognised feeding, breeding or aggregation areas for these species, hence large numbers of these species are not anticipated to be encountered during the survey.

3.3. Marine Reserves

WA-489-P and the metocean buoys do not overlap any Marine Conservation Areas. The zone of potential impact for a worst case spill overlaps the general use areas of the Commonwealth's Gascoyne and Montebello Marine Reserves but does not overlap the Ningaloo Coast World Heritage Area. The overlap with the zone of potential impact occurs over open ocean habitat only.

3.4. Socio-Economic Environment

Nature-based tourism provides a significant economic benefit to the Exmouth region. Tourism is centred around Ningaloo Reef, Shark Bay and other inshore waters that are popular for scuba diving and snorkelling and provide the opportunity to observe whales, whale sharks, dolphins and manta rays. With the exception of offshore fishing charters, most marine tourism activities occur within State waters close to the coast. Commercial tour boat operators generally operate along the middle to northern end of the reef and the seasonal whale shark searches are conducted within the Marine Park.

Recreational beach and ocean fishing are also popular attractions, with high fishing effort recorded off the west coast of the North West Cape Peninsula extending beyond the Marine Park boundaries to approximately 100 km offshore. Offshore fishing charters are managed by the Director of National Parks and require special permits. Recfishwest is the recognised recreational fishing body in Western Australia. Recfishwest have been informed about the activity.

Game fishing tournaments are held annually off Exmouth waters in March. The present of the metocean buoys is not likely to impact on tourism activities, especially given their offshore location. Consultation has been undertaken and will continue to be undertaken with the Coral Bay Progress Association, representing the tourist operators working out of Coral Bay.

The metocean study area overlaps with a variety of commercial fishing management areas. State managed fisheries overlapping the permit area include the Mackerel Fishery and the West Coast Deep Sea Crustacean. Commonwealth managed fisheries overlapping the permit area include the Southern Blue Fin Tuna Fishery, the Western Skipjack Fishery, and the Western Tuna and Billfish Fishery.

Extensive petroleum exploration and production activity occurs in the region and the industry has developed major production and/ or storage operations on Barrow, Thevenard and Varanus islands and in the waters off North West Cape. There are five existing floating production and storage operations developments south-west of WA-489-P (e.g. Enfield, Stybarrow, Vincent, Pyrenees, Van Gogh) closer to the Ningaloo Marine Park. There is no existing petroleum infrastructure in WA-489-P or adjacent permit areas, nor does the zones of potential impact for a 200 m^3 spill overlap with these floating production and storage operations.

Vessels travelling along the shipping lane running parallel to the Western Australian coastline and heading in a northerly direction to the Port of Dampier (associated with iron ore carriers, salt carriers and LNG tankers) and beyond to South East Asian ports may pass 150-200 km to the west of WA-489-P. However, shipping traffic in WA-489-P itself is limited. Regular liaison will occur with the Australian Maritime Safety Authority, including the issuing of a 'Notice to Mariners' to alert shipping traffic.

There are no known sites of Aboriginal cultural significance within the permit area.

4. Management Approach

The Shell Commitment and Policy on Health, Safety, Security, Environment and Social Performance (HSSE and SP) applies across Shell globally and is designed to protect people and the environment.

Key features of the policy are:

- Systematic approach to HSSE and SP management designed to ensure compliance with the law and to achieve continuous performance improvement;
- Targets for improvement and measurement, appraisal and performance reporting;
- Requirement for contractors to manage HSSE and SP in line with this policy; and
- Effective engagement with neighbours and impacted communities.

All of Shell's operations comply with the Shell HSSE and SP Control Framework, a comprehensive corporate management framework, comprising a simplified set of mandatory standards applicable to every Shell Company, contractor and joint venture under Shell's operational control.

The metocean study will be managed to comply with the relevant State and Commonwealth Acts and Regulations, industry standards and applicable international agreements.

Shell's overall environmental objective for the activity is to avoid or reduce environmental risks to as low as reasonably practicable. Specific objectives, standards and performance criteria for each aspect of the survey that has the potential to cause adverse environmental impact have been identified. Environmental performance will be measured and reported against these

standards and criteria as part of Shell's commitment to continuous improvement of environmental, health and safety performance.

An Implementation Strategy has been incorporated into the Environment Plan per the *OPGGS (E) Regulations 2009*. This includes:

- Measures, systems, practices to ensure environmental performance objectives and standards are met;
- Chain of Command;
- Measures to ensure workers are aware of their responsibilities;
- Monitoring and management;
- Records and reporting;
- Oil Spill Contingency Plan, and
- Consultation.

5. Environmental Hazards and Controls

A risk analysis has been undertaken for all aspects of operations, in accordance with the Shell HSSE and SP Control Framework and in line with the principles outlined in the Australian Standard AS/NZS ISO 31000:2009 Risk Management and HB 203:2006 Environmental Risk Management. To demonstrate that risks are as low as reasonably practicable, all mitigation measures have been considered and where these measures are practical, they have been included.

Incidents with a consequence severity equal to or greater than level 3 (i.e. moderate to massive) are considered 'Reportable Incidents' in line with Regulation 26 of the *OPGGS (E) Regulations*. For the metocean study, based on the risk assessment, though the probability of occurrence is low, two possible events, are considered to have a moderate or greater consequence, if they occur:

- Death or injury of a member of a threatened or migratory or cetacean species as a result of a collision with a vessel; and
- A diesel spill resulting from a vessel to vessel collision.

To avoid a potential vessel collision with marine life, during transit support vessels will adhere to the intent of the *Australian National Guidelines for Whale and Dolphin Watching 2005*, which require that: Vessel Masters shall maintain a watch for whales during transit; Vessel Masters shall not knowingly approach within 300 m of whales; If whales are observed within 300-100 m of a vessel during transit, Vessel Masters will alter course away from the whales if safe to do so; If whales are observed <100 m from a vessel, Vessel Masters will power down to 'no wake speed' and alter course away from the whales if safe to do so.

To avoid a vessel to vessel collision, a 'Notice to Mariners' advising of the presence of the metocean study vessel will be issued through the Australian Maritime Safety Authority prior to the commencement of the survey. Ongoing communication with the Australian Fisheries Management Authority and other commercial mariners will also occur such that that presence of the vessel is widely communicated. Vessel routes to and from the survey area will be pre-determined and risk assessed. The vessel will be equipped with suitable navigation aids,

lighting and competent crew maintaining continual watch for other vessels. Should a spill occur, an Oil Spill Contingency Plan is in place, which outlines Shell's oil spill preparedness and response for the activity. Oil Spill Modelling Assessment indicates hydrocarbons, from a loss of containment on the surface, has low probabilities of reaching environmental sensitivities.

The remainder of possible events, both planned and accidental are assessed as having slight or minor consequences. The risk assessment can be viewed in Appendix A.

6. Consultation

Shell has been operating in the Exmouth region for several years. Over this time Shell has developed relationships and built a comprehensive stakeholder database of both government and non-government organisations and individuals that have an interest in our activities.

The consultation for the metocean study has been built upon the relationships developed during the consultation undertaken for the Palta exploration well and related seismic activities in the Exmouth basin. Shell began consultation with identified stakeholders specifically on the metocean activity in Q4 2013.

Engagement on the activity will continue in early 2014 leading up to, during, and post the completion of the activity. Shell will ensure that all key stakeholders are kept informed of project progress and outcomes and are able to raise questions/concerns at anytime.

7. Contact Details

For further information, please contact:

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APPENDIX A: Hazards and Controls

Hazard / Event	Safeguards – Mitigation Methods (control and recovery measures)
Planned Activities	
Physical presence of survey vessels.	A 'Notice to Mariners' advising of the presence of the metocean study will be issued through the Australian Maritime Safety Authority prior to the commencement of the survey. Liaison with Australian Maritime Safety Authority, Fisheries Management Authorities and other commercial mariners. Vessel will display all required navigation lighting to reduce any navigation hazard to passing vessels and will be equipped with navigation equipment and will undertake continuous surveillance of marine traffic in the area. Tracking devices are fitted to the buoys to allow monitoring and efficient retrieval in the unlikely event a buoy goes adrift. Mooring design (predominantly wire and chain under tension) reduces risk of entanglement. Mooring location will be away from known migration corridors with only low numbers of cetaceans likely to transit through the area. There are no known instances of entanglement with buoys and marine fauna.
Lighting from the vessels.	Location of the metocean buoy is in open ocean ~ 250 km from the closest environmental sensitivity.
Acoustic pollution from airguns and vessel movements.	Location of the metocean study is in open ocean, well away from coastal environments and fauna migration routes. Acoustic Doppler Current Profiler and acoustic release frequencies above known hearing ranges of sensitive marine fauna and source volumes low and below background levels. Vessel movements are limited and present no increased risk over background shipping activity and are not considered further.
Deployment of moorings system	Location of moorings in non-sensitive deep water, open ocean muddy benthic environment, will be well away from sensitive shallow water environments and fauna such as coral reefs. Clump weights are expected to sink below mud line and have no measurable long-term impact.

Discharge of deck drainage waste, sewage, food scraps and grey water from the vessel.	Potentially contaminated water drained to slops tanks and passed through the oil/ water separator prior to discharge at <15 ppm or stored for onshore disposal (*MARPOL 73/78 Annex I – Regulation for the Prevention of Pollution by Oil from Ships under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983*. Location of study in open ocean will be away from coastal environments. Food wastes, grey water and sewage treated in accordance with *MARPOL 73/78 Annex V – Regulation for the Prevention of Pollution by Garbage from Ships under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983*: • MARPOL 73/78 Annex IV: Sewage; and • MARPOL 73/78 Annex V: Garbage.
Atmospheric emissions from fuel combustion and incineration on the vessel.	Engines will be maintained to operate efficiently. Compliance with *MARPOL 73/78 Annex VI – Regulation for the Prevention of Air Pollution from Ships,* enforced under the *Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983*. Location of study in open ocean will be away from coastal environments and human receptors.
Unplanned Activities	
Vessel collision with marine life.	Support vessels during transit will adhere to the requirements of the Environment Protection Biodiversity Conservation Regulations 2000 Part 8, Australian National Guidelines for Whale and Dolphin Watching; and industry experience, specifically: • Vessel Masters shall maintain a watch for whales during transit; • Vessel Master not knowingly approach within 300 m of whales or 50 m of dolphins; • If whales are observed within 300-100 m of vessel during transit, Vessel Master will maintain or reduce speed and alter course away from the whales if safe to do so; and • If whales are observed <100 m from vessel, Vessel Master will power down to 'no wake speed' (< 4 knots) and alter course away from the whales if safe to do so.
Introduction of Non Native Marine Species.	All vessels will comply with Commonwealth quarantine requirements including: • Australian Ballast Water Requirements; and • Biofouling Management Protocols.

Discharge of wastes or chemicals into the ocean.	Garbage Management Plans developed to *MARPOL 73/78 Annex V – Regulation for the Prevention of Pollution by Garbage from Ships and Annex II– Regulation for the Prevention of Pollution by Noxious Liquid Substances in Bulk from Ships and Annex III– Regulation for the Prevention of Pollution by Harmful Substances Carried by Sea from Ships* under the *Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983*). Oil spill kits and Oil Spill Contingency Plan.
Spill resulting from a collision with another vessel.	A 'Notice to Mariners' advising of the presence of the metocean buoy will be issued through Australian Maritime Safety Authority prior to the commencement of the activity. Consultation with Fisheries authorities and other commercial mariners such that that presence of vessels is widely communicated. Vessel routes are pre-determined and risk assessed. Vessel equipped with suitable navigation aids, navigational lighting and competent crew maintaining a continual watch for other vessels. Regulator accepted Oil Spill Contingency Plan prior to activity commencement. Oil Spill Modelling Assessment for all seasons indicates that hydrocarbon, from a loss of containment on the surface, has a low probability of reaching environmental sensitivities.